

REMARKS

Claims 1-10 were pending in the application.

Claims 1-10 stand rejected.

Claims 1 and 3-10 are rejected under 35 U.S.C. 103(a) as being obvious over Fisher, Mullen and Zhao.

Claim 2 is rejected under 35 U.S.C. 103(a) as being obvious over Fisher, Mullen and Zhao in view of Akram.

Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being obvious over Coyle and Ommen.

Claim 2 is rejected under 35 U.S.C. 103(a) as being obvious over Coyle and Ommen in view of Gondunsky.

Previously pending claims 1, 2 and 6-10 are amended hereby. New claims 11-15 are added hereby. No new matter is added.

Claims 1-16 are now in the case for consideration.

Applicant requests reconsideration and allowance of the claims in light of the above amendments and following remarks.

Formal Amendments

Applicant has taken the liberty of making two minor amendments to the specification to make it read better, in contemplation of the present application soon being allowed and published as a patent. Specifically, degree symbols (°) have been correctly rendered where needed.

Applicant has also voluntarily amended claim 1 to omit an unnecessary and mistaken limitation regarding electrical connection.

Applicant has also voluntarily added new claim 11 depending from claim 6 to include the heatsink limitation of original 2.

Applicant has amended various of the claims to read better, e.g. "comprised of" to "comprises". Some punctuation has been corrected.

Finally, applicant has added new claim set 12-16 to more fully flesh out their invention without adding new matter.

Claim Rejections – 35 U.S.C. § 103

Claims 1 and 3-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fisher (U.S. 5,936,758) in combination with Mullen (U.S. 5,241,133) and Zhao (U.S. 6,882,042).

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fisher (U.S. 5,936,758), Mullen (U.S. 5,241,133) and Zhao (U.S. 6,882,042) as applied to claim 1 and further in combination with Akram (U.S. 2001/0004564).

Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coyle (U.S. 2001/0034083) in combination with Ommen, et al. (U.S. 5,397,917).

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Coyle (U.S. 2001/0034083) and Ommen, et al. (U.S. 5,397,917) as applied to claim 1 and further in combination with Gondunsky, et al. (U.S. 5,050,040).

Applicant respectfully traverses the rejections.

Applicant and Examiner apparently are in agreement that the known prior art does not show a metallic layer “formed on the back surface of a semiconductor chip surface”, either directly or without an adhesive layer therebetween, to the disclosed advantage of improved adhesion by an adhesive of the semiconductor chip to the top surface of a base substrate as disclosed. (See Specification at page 6, lines 29-31.) Thus, although the Examiner’s formal position in his Response to Arguments starting at page 5 and extending to the top of page 6 that “applicant has failed to claim [the argued] feature” wherein the metallic layer is “directly attached to chip with no intervening material,” the Examiner makes something of a concession in his footnote 2 at the bottom of page 6 that applicant may well be correct (“Even if properly claimed...”) and the Examiner may well be wrong about whether the affirmative “formed on” limitation is definite and distinctive over the prior art.

Applicant most strongly disagrees that his claims are ambiguous in regard to the relationship between his claimed metallic layer and his claimed semiconductor chip.

Applicant’s choice of the term “formed on the back surface of” to describe the relationship between his metallic layer 115 and his semiconductor chip 112 makes it abundantly clear that there is no intervening adhesive layer and that the metallic layer is in direct contact, e.g. plating, contact therewith. Thus, applicant does not deem it necessary further to distinguish the prior art, which consistently places an adhesive layer between its substrates and its semiconductor chips or dies, than with the recitation “formed on.” Applicant elsewhere and in other contexts *but compellingly enough within the body of the very same claim* refers instead to his adhesive as being “attached to”—not formed on—his base substrate and the metallic layer. This unambiguous distinction within each and every

claim as originally filed and remaining still within all claims under consideration is deemed sufficient to distinguish the prior art every one of which utilizes adhesive layers between substrate and chip *but not a single one of which remotely suggests also forming a metallic layer on the back surface of the semiconductor chip to enable firm attachment of a metallic adhesive thereto and yet to attach overall the semiconductor chip to the base substrate.*

In order to advance the present application to issuance, and without conceding the Examiner's failure to appreciate the recited distinctions in applicant's claims, nevertheless applicant hereby amends claims 1 and 12 to add more clarifying and distinguishing language and while amending claim 6 which was thought to be unambiguous before to even more clearly establish the recited relationship between the back surface of the semiconductor chip and the metallic layer formed thereon. Specifically, amended claim 1 recites an additional limitation "without an adhesive layer" between the metallic layer formed on the back of the semiconductor chip and the back of the semiconductor chip (which seems redundant for the reasons stated above). Amended claim 12 recites an additional limitation that the metallic layer is formed "directly" on the back surface of the semiconductor chip (which also seems redundant for the reasons state above). Amended claim 6 recites even more clearly than before that a base substrate has a top and a bottom surface, that the semiconductor chip has one or more micro-mirrors formed on a front surface thereof and a metallic layer formed on a back surface thereof, that an adhesive layer adheres the metallic layer of the chip's bottom surface to the top surface of the base substrate, wherein the chip is attached to the substrate via the adhesive.

Applicant urges entry of the amendments, a quick review of the same prior art that applicant's claims as originally filed should have inspired and allowance of all amended claims in their various manifestations.

The limitations are supported in the originally filed specification, which of course includes the drawings of record, which clearly show in Figs. 4 and 12-16 that nothing comes between metallic layer 115 and the back of semiconductor chip 112. It is impossible to interpret the drawings any other way, and the written description of the invention is equally clear, by its description of the wafer-level "forming" of metallic layer 192 (Fig. 5) "formed on the back surface of the wafer" that, when cut and separated, becomes the back surface of the semiconductor chip (page 6, lines 10-13; Fig. 5).

It is fundamental that an application teaches by way of its drawings as well as by way of its words. In the present case, it teaches both ways, consistently and unambiguously and patentably distinctly over the prior art, to those who would read it fairly and fully.

New claims 11-16 are definite and patentably distinct over the prior art. Claim 11 is like original and amended claim 2 but depends instead from claim 6. Applicant submits that claim 11 is allowable.

Independent claim 12 is like amended claim 6, but even more definitively recites that the metallic layer is formed “directly” on the back surface of the semiconductor chip. Applicant submits that such is not new matter, since it is clearly shown in the original drawings including Fig. 4 and 12-16 that there is nothing between metallic layer 115 and semiconductor chip 112 immediately thereabove. Since all other adhesive layers, e.g. metallic adhesive 130 are clearly shown and described as existing, it is only reasonable for one of ordinary skill in the art reading applicant’ disclosure to conclude with certainty that applicant’ metallic layer 115 is formed “directly” on the back surface of the semiconductor chip, as is recited in new claim 12.

This is indisputably clear from a fair reading of the specification as a whole, including the numerous references to “metallic layer 115 ... formed on the back surface of the semiconductor chip 112. Specification, page 6, lines 10-13. See also Fig. 5 where “Forming Metallic Layer” 115 is illustrated at block 192 in a flowchart representation of the method of manufacturing the claimed DMD package. “Formed” means exactly what it says, and is clearly distinguished by applicant from “attached”, the term they use to describe how metallic adhesive 130 is placed between the metallic layer and the substrate. It is even more abundantly clear that metallic layer 115 is formed “directly” on the back surface of semiconductor chip 112 when the entire specification is read and it is concluded that metallic layer 115 is formed preferably by flow soldering when plural ones of the DMD packages are arrayed in a unitary wafer before singulation. See Figs. 5 and 6 at 110, 191, 192 and 193 (formation of metallic layer 115 is between preparation and full-cutting of *wafer 110*). See also Specification at page 6, lines 29-31 (“The [formed] metallic layer 115 enables the metallic adhesive [130] to be firmly attached to the back surface 110b of the wafer 110.”) Any reasonably capable person reading this would conclude that forming the metallic layer on the back surface of the semiconductor chip is without an adhesive, i.e. direct, while attaching the chip to the substrate is with an (intermediate) adhesive layer, i.e. indirect.

New claims 13, 15 and 16 depend from new claim 12 and are like amended claims 3, 2 and 4, respectively. New claim 14 is like the last element of original and amended claim 1. Applicant submits that the new dependent claims 13-16 are allowable along with independent claim 12.

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For the foregoing reasons, reconsideration and allowance of claims 1-16 of the application as amended is solicited. The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

Respectfully submitted,

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